Trend Study 18-7-97

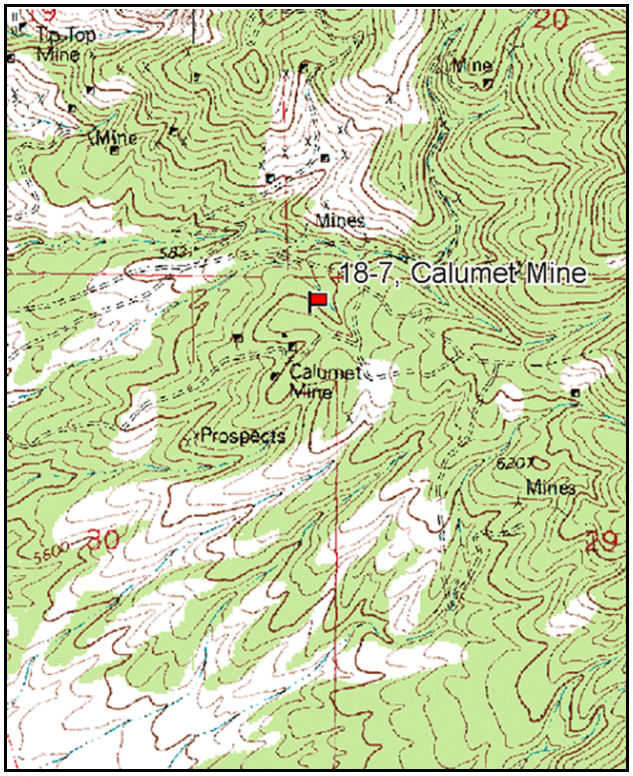
Study site name: Calumet Mine . Vegetation type: Mixed Oak-Sage .

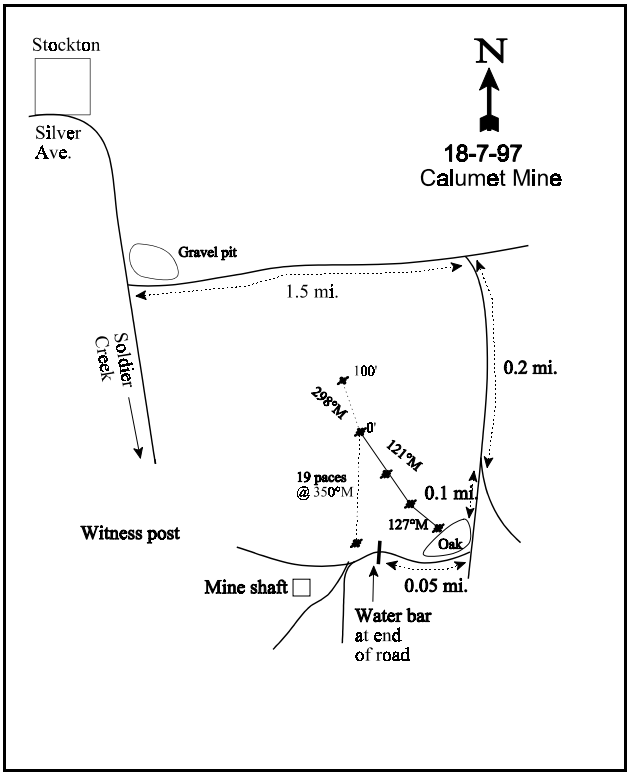
Compass bearing: frequency baseline 298 degrees magnetic. (Line 2 @ 121°M, line 3-4 @ 127°M).

Frequency belt placement: line 1 (11 & 71ft), line 2 (95ft), line 3 (59ft), line 4 (34ft).

LOCATION DESCRIPTION

Take Silver Avenue east from the main highway in Stockton to the Soldier Creek Road. Go south to the athletic field outside of town. Continue 0.25 miles to a dirt road to the 1eft (east) just south of a gravel pit. Go 1.5 miles, always staying on the main road, to an intersection. Turn right and go 0.20 miles to a fork. Stay to the right for 0.1 miles to another fork. Go right and continue approximately 0.05 miles to a water bar which effectively ends the road. Continue up the road another 100 yards to a short witness post on the right side of the road. From here walk 350°M for 19 paces into the oak brush to the 0-foot mark of the baseline.





Map Name: Stockton

Diagrammatic Sketch

Township 4S , Range 4W , Section 30

GPS: NAD 27, UTM 12S 4478291 N 387292 E

DISCUSSION

Calumet Mine - Trend Study No. 18-7

***SUSPENDED - This site was suspended in 2002 and needs to be moved to a better location. Text and tables from the 1997 report have been retained and are found below.

The Calumet Mine study is located on what was considered important deer winter range at one time east of Stockton, near the Calumet Mine. The site has an elevation of 5,800 feet on a north slope (10%). The study begins near the top of a small "finger-like" ridge covered with mixed Gambel oakbrush and mountain big sagebrush that extends a short distance downslope. Deer use of the area appeared moderate in 1983. In 1989 deer use was thought to be light. The pellet group frequency in 1997 indicated that deer use was also light with a 8% quadrat frequency.

Soil has some rock on the surface (about 7% cover), but otherwise it is moderately fine textured. Effective rooting depth is more than 11 inches with a soil temperature of 51°F at almost 14 inches. This is the first site (after sites 18-3, 18-4, 18-5, and 18-6) that has more than 10 ppm of phosphorus in the soil. Therefore, on this site it would not be considered a limiting factor to plant growth and development. Soil textural analysis indicates a sandy loam soil with a soil reaction that is neutral (pH of 6.8). Litter cover and soil organic matter content vary greatly between the oak clones and big sagebrush openings. Under the oak, litter cover is high. Big sagebrush openings have much less protective ground cover and show evidence of moderate erosion.

Low growing Gambel oak comprises the bulk of mid and overstory vegetation, as it now contributes to 51% of the browse cover or 30% of the total vegetative cover. Oak initially had an estimated density of 20,932 stems/acre, but currently with the extended transect, this estimate is down to about 13,060 stems/acre. Age structure data is characteristic of a healthy and expanding population. Oakbrush utilization has generally been light through all sampling periods and sprouts appear to be steadily invading into sagebrush openings.

Mountain big sagebrush is the second highest producer of browse cover. In 1983, it appeared to be a declining population with only moderate to good vigor and 38% showing moderate use. Percent decadence was at 24% with no seedlings encountered and young only made up 10% of the population. Percent decadence did increase to a high of 45% by 1989, but the percentage of the population that were classified with moderate use decreased to 25%. By 1997, percent decadence further declined to 18% with those classified as having moderate use also declining to 15%. The increase in its population is because the sampling design was greatly increased and now picks up a much better sample of the population. Other browse species are less common. The most important is stickyleaf low rabbitbrush, a shrub which appeared to be slowly expanding in 1983. Now the population is at 2,080 plants/acre. Isolated and heavily hedged individuals of antelope bitterbrush occur in the immediate vicinity but were not encountered on any study plots.

In 1983, perennial grasses were described as occurring frequently, but nowhere do they form dense cover. This could also apply currently. The three species of the bluegrass (mutton, Kentucky and Sandberg bluegrass) are still the most common perennial species, followed by bluebunch wheatgrass, Indian ricegrass, and bottlebrush squirreltail. All of these show evidence of light utilization. Cheatgrass is most frequently encountered within sagebrush openings where it forms a sparse cover that furnishes 7% of the total grass cover.

Forb composition is diverse but somewhat depleted and unproductive. For an oakbrush type, comparatively there is less cover and lower densities for the forbs. Annual, biennial, and perennial increasers are common. Species such as bastard toadflax, foothill deathcamas, longleaf phlox, and rock goldenrod are among the most frequently observed forbs within the area. More palatable forbs include redroot eriogonum and narrowleaf lomatium.

1983 APPARENT TREND ASSESSMENT

Based upon apparent trend indicators, soil trend appears to be declining slightly. The dispersion of ground cover is highly variable and evidence exists for moderate erosion, especially within sagebrush openings. Vegetatively, trend is toward a thickening oak stand, which gradually is crowding out mountain big sagebrush. Understory plants will likely remain a minor forage component.

1989 TREND ASSESSMENT

Soil trend was determined as stable, with little changes in ground cover. Percent bare soil has declined from 15% to 12%. The trend for browse is down slightly. Mountain big sagebrush showed a large increase in percent decadence (24% to 45%) and a 31% decrease in its density. Stickyleaf low rabbitbrush also showed signs of decline with an increase in percent decadence (0% to 33%) and a lower population estimate. Herbaceous understory trend is slightly upward with increases for both grasses and forbs.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - up slightly (4)

1997 TREND ASSESSMENT

Trend for soils would be considered slightly improved with further decreases in percent bare soil (12% to 7%). Protective cover provided by litter and herbaceous vegetation is good. The trend for browse, primarily sagebrush and stickyleaf low rabbitbrush, is up and improving with decreases in percent decadence for both species. The percentage of sagebrush with moderate use has also decreased. The density estimates for both species also increased, but this is more reflective of the much larger sample size giving better population estimates for shrub species. The herbaceous understory trend is slightly improved, with most of the improvement with the grasses.

TREND ASSESSMENT
soil - slightly up (4)
browse - up (5)
herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'97	'83	'89	'97	'97
G	Agropyron spicatum	a13	a2	b118	5	1	38	6.00
G	Bromus tectorum (a)	-	-	92	-	-	34	1.23
G	Oryzopsis hymenoides	6	5	3	2	2	1	.04
G	Poa bulbosa	a-	a-	b26	-	-	8	1.54
G	Poa fendleriana	a14	b45	50	7	20	21	.91
G	Poa pratensis	a151	b203	134	48	60	41	6.51
G	Poa secunda	b105	a72	a53	44	27	22	.70
G	Secale spp.	-	-	3	-	-	1	.00
G	Sitanion hystrix	a2	b23	ab19	1	10	10	.45

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'97	'83	'89	'97	'97
Total for Annual Grasses		0	0	92	0	0	34	1.23
Total for Perennial Grasses		291	350	406	107	120	142	16.18
Total for Grasses		291	350	498	107	120	176	17.41
F	Agoseris glauca	$_{a}$1	$_{a}$2	$_{b}$13	1	1	10	.05
F	Alyssum alyssoides (a)	-	-	58	-	-	26	.25
F	Allium spp.	-	-	5	-	-	2	.06
F	Ambrosia psilostachya	-	-	3	-	-	1	.03
F	Antennaria rosea	-	8	2	-	4	2	.03
F	Arabis spp.	$_{a}$1	$_{ab}$6	$_{b}$15	1	2	7	.03
F	Astragalus tenellus	$_{a}$-	$_{a}$-	$_{b}$12	-	-	6	.38
F	Astragalus spp.	$_{A}$-	$_{a}$2	$_{b}$18	-	1	9	.73
F	Astragalus utahensis	-	-	9	-	-	3	.07
F	Balsamorhiza hookeri	-	-	1	-	-	1	.03
F	Calochortus nuttallii	-	-	7	-	-	3	.07
F	Castilleja spp.	-	-	24	-	-	12	.19
F	Chaenactis douglasii	-	3	-	-	3	-	-
F	Cirsium spp.	-	-	15	-	-	8	.53
F	Collomia linearis (a)	-	-	19	-	-	8	.04
F	Comandra pallida	115	111	63	50	53	29	.83
F	Collinsia parviflora (a)	-	-	63	-	-	25	.20
F	Crepis acuminata	-	17	26	-	11	14	.21
F	Delphinium nuttallianum	-	4	-	-	3	-	-
F	Draba spp. (a)	-	-	3	-	-	1	.00
F	Epilobium brachycarpum (a)	-	-	9	-	-	5	.02
F	Erodium cicutarium (a)	-	-	2	-	-	1	.00
F	Erigeron pumilus	-	-	2	-	-	1	.00
F	Eriogonum racemosum	15	15	22	7	7	8	.06
F	Galium aparine (a)	-	-	35	-	-	14	.17
F	Grindelia squarrosa	-	-	3	-	-	1	.03
F	Hydrophyllum spp.	$_{a}$-	$_{a}$2	$_{b}$15	-	1	7	.21
F	Lathyrus pauciflorus	$_{b}$15	$_{b}$22	$_{a}$-	7	9	-	-
F	Lactuca serriola	-	-	2	-	-	1	.00
F	Lithospermum ruderale	-	-	3	-	-	1	.18
F	Lomatium triternatum	$_{a}$-	$_{c}$28	$_{b}$6	-	18	4	.02
F	Microsteris gracilis (a)	-	-	23	-	-	7	.03
F	Orobanche fasciculata	-	-	2	-	-	1	.00
F	Petradoria pumila	$_{a}$3	$_{ab}$25	$_{b}$43	1	11	16	1.16
F	Phacelia spp.	-	1	-	-	1	-	-
F	Phlox longifolia	$_{a}$2	$_{b}$22	$_{ab}$13	1	11	5	.05

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'97	'83	'89	'97	'97
F	Polygonum douglasii (a)	-	-	16	-	-	5	.02
F	Ranunculus testiculatus (a)	-	-	43	-	-	17	.11
F	Tragopogon dubius	$_{a}$1	$_{ab}$10	$_{b}$12	1	5	6	.08
F	Veronica biloba (a)	-	-	6	-	-	2	.01
F	Zigadenus paniculatus	-	7	3	-	3	1	.00
Total for Annual Forbs		0	0	277	0	0	111	0.87
Total for Perennial Forbs		153	285	339	69	144	159	5.08
Total for Forbs		153	285	616	69	144	270	5.96

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 18 , Study no: 7

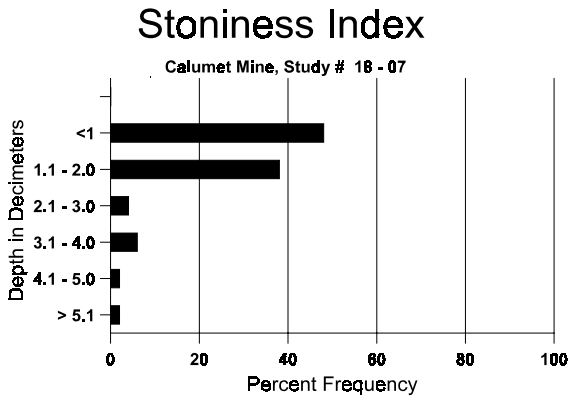
Type	Species	Strip Frequency	Average Cover %
		'97	'97
B	Ambrosia spp.	0	.38
B	Artemisia tridentata vaseyana	65	10.65
B	Chrysothamnus nauseosus albicaulis	5	.15
B	Chrysothamnus viscidiflorus viscidiflorus	47	2.07
B	Gutierrezia sarothrae	5	.21
B	Juniperus osteosperma	2	1.70
B	Opuntia spp.	8	.18
B	Pinus monophylla	0	1.00
B	Quercus gambelii	45	17.18
B	Tetradymia canescens	2	.15
Total for Browse		179	33.71

BASIC COVER --
Herd unit 18 , Study no: 7

Cover Type	Nested Frequency	Average Cover %		
	'97	'83	'89	'97
Vegetation	366	2.50	2.75	51.97
Rock	105	6.00	9.25	3.84
Pavement	130	.50	1.00	3.07
Litter	394	75.00	74.75	63.52
Cryptogams	58	1.00	0	.85
Bare Ground	139	15.00	12.25	6.90

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 7, Calumet Mine

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.4	51.2 (13.7)	6.8	60.4	22.1	17.6	2.5	15.0	201.6	.5



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 7

Type	Quadrat Frequency '97
Rabbit	8
Deer	8

BROWSE CHARACTERISTICS --
Herd unit 18 , Study no: 7

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	89	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	83	15	4	-	-	-	-	-	-	-	17	2	-	-	1266	21	28	19
	89	7	1	-	1	-	-	-	-	-	8	-	1	-	600	19	24	9
	97	77	16	5	11	-	-	-	-	-	109	-	-	-	2180	48	55	109
D	83	-	7	-	-	-	-	-	-	-	2	4	1	-	466			7
	89	6	3	-	-	-	-	-	-	-	8	-	1	-	600			9
	97	17	6	1	2	-	-	-	-	-	16	-	-	10	520			26
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	560			28

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	38%	00%	03%	-31%
'89	25%	00%	10%	+54%
'97	15%	04%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	1932	Dec:	24%
	'89	1333		45%
	'97	2920		18%

Chrysothamnus nauseosus albicaulis																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20	20	22	1
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	1	-	-	-	-	-	-	-	-	2	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	22%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	0%
	'89	0		0%
	'97	180		22%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
Y	83	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	97	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
M	83	18	-	-	-	-	-	-	-	-	18	-	-	-	1200	14	12	18
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200	13	12	3
	97	78	-	-	12	-	-	11	-	-	101	-	-	-	2020	13	16	101
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	4	-	-	-	-	-	-	-	-	3	-	-	1	266			4
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	-54%
'89	00%	00%	08%	+62%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	1733	Dec:	0%
	'89	799		33%
	'97	2080		0%

Gutierrezia sarothrae																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	17	-	-	-	-	-	-	-	-	17	-	-	-	340	6	6	17

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	440		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	40		-

Opuntia spp.																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160	6	10	8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	160		-

Pinus monophylla																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	0	Dec:	-
	'89	0		-
	'97	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Quercus gambelii																		
S	83	8	-	-	-	-	-	-	-	-	8	-	-	-	533			8
	89	100	-	-	-	-	-	3	-	-	94	9	-	-	6866			103
	97	3	-	-	-	-	-	6	-	-	9	-	-	-	180			9
Y	83	63	-	-	-	-	-	-	-	-	63	-	-	-	4200			63
	89	223	2	-	-	-	-	-	-	-	183	40	1	1	15000			225
	97	197	-	-	38	-	-	41	-	-	276	-	-	-	5520			276
M	83	206	41	-	-	-	-	-	-	-	228	19	-	-	16466	37	22	247
	89	120	-	2	-	-	-	-	-	-	108	14	-	-	8133	39	28	122
	97	356	-	-	9	-	-	-	-	-	365	-	-	-	7300	49	33	365
D	83	-	4	-	-	-	-	-	-	-	1	2	1	-	266			4
	89	17	-	1	-	-	-	-	-	-	6	11	-	1	1200			18
	97	9	-	-	3	-	-	-	-	-	10	-	-	2	240			12
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	1640			82

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	14%	00%	.31%	+14%
'89	.54%	.82%	.82%	-46%
'97	00%	00%	.30%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	20932	Dec:		1%
'89	24333			5%
'97	13060			2%

Tetradymia canescens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	19	32	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	0	Dec:		-
'89	0			-
'97	60			-